

Notice of Allowability

Application No.

09/232,498

Examiner

Mark Ruthkosky

Applicant(s)

MIZUNO, SEIJI

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7.12.2006
2. ☒ The allowed claim(s) is/are 4 and 9.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 4/6/2006
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

MARK RUTHKOSKY
PRIMARY EXAMINER

Mark Ruthkosky

9-28-2006

DETAILED ACTION

Claim Rejections - 35 U.S.C. § 103

The rejection of claims 1, 5, 6, 7, 8 and 11 under 35 U.S.C. 103(a) as being unpatentable over Hidekuni (JP 08-151,461) in view of Pellegrini et al. (US 4,197,178) has been overcome by applicant's cancellation of the claims.

The rejection of claims 1 and 11 under 35 U.S.C. 103(a) as being unpatentable over Kougorou (JP 59042781), in view of Pellegrini et al. (US 4,197,178) has been overcome by applicant's cancellation of the claims.

The rejection of claims 1, 3, 5 and 7-8 under 35 U.S.C. 103(a) as being unpatentable over Kougorou (JP 59042781) in view of Pellegrini et al. (US 4,197,178), as cited in the previous section, and further in view of Sandelli et al. (US 4,643,956) has been overcome by applicant's cancellation of the claims.

The rejection of claims 1, 3, 5-8 and 11 under 35 U.S.C. 103(a) as being unpatentable over Sandelli et al. (US 4,643,956), in view of Hidekuni (JP 08-151,461) OR Kougorou (JP 59042781, abstract, and further in view of Pellegrini et al. (US 4,197,178), as previously applied has been overcome by applicant's cancellation of the claims.

The rejection of claims 1, 3, 5-8 and 11 under 35 U.S.C. 103(a) as being unpatentable over Kougorou (JP 59042781, abstract) in view of Pellegrini et al. (US 4,197,178,) as previously applied, and further in view of Hidekuni (JP 08-151,461) has been overcome by applicant's cancellation of the claims.

Art Unit: 1745

The rejection of claim 13 under 35 U.S.C. 103(a) as being obvious over Taylor (US 4,592,968) OR Sandelli (US 4,643,956), in view of Pellegrini et al. (US 4,197,178) has been overcome by applicant's cancellation of the claims.

The rejection of claim 10 under 35 U.S.C. 103(a) as being unpatentable over Taylor (US 4,592,968) OR Sandelli et al. (US 4,643,956), as described with regard to claim 13 in the previous section, in view of Hidekuni et al. (JP 08-151,461) OR Kougorou (JP 59042781, abstract), and further in view of Pellegrini et al. (US 4,197,178) has been overcome by applicant's cancellation of the claims.

Allowable Subject Matter

Claims 4 and 9 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a method of manufacturing a separator for a fuel cell comprising the steps of preparing a raw material by mixing a carbon, an epoxy resin and a phenolic resin, wherein said phenolic resin is different from said epoxy resin, and further wherein a ratio of an amount of an epoxy group of said epoxy resin to an amount of a hydroxyl group of said phenolic resin in the raw material is adjusted to a value ranging from 0.8 to 1.2 such that generation of a reaction byproduct gas is minimized, charging the raw material into a predetermined mold; and heat-press forming the raw material charged into the mold into a ribbed separator at a temperature which is from 140 °C to 220 °C, the ribbed separator thus formed having a property or gas-impermeability.

Art Unit: 1745

With regard to claim 4, which is to a method of manufacturing a separator for a fuel cell comprising the steps of mixing a carbon, and a resin, charging the material into a mold, heat pressing the material and grinding a surface of the separator, the claim includes the limitation that glycidylamine is the epoxy resin. The most pertinent prior art has been noted. The prior art does not teach this method including glycidylamine as the epoxy resin of the separator.

With regard to claim 9, which is to a method of manufacturing a separator for a fuel cell comprising the steps of mixing a carbon, and a resin, charging the material into a mold, heat pressing the material and grinding a surface of the separator, the method step includes preparing a slurry with resin particles with specific sizes and particle size distributions that are prepared by spraying and drying the slurry. The most pertinent prior art has been noted in the claims. The prior art does not teach this method including the step of preparing a slurry with resin particles with specific sizes and particle size distributions which are accomplished by spraying and drying the slurry. Thus, these claims are allowed.

The most pertinent prior art has been presented. For example, Hidekuni et al. (JP 08-151,461) teaches a method of manufacturing a separator for a fuel cell comprising the steps of preparing a raw material by mixing a carbon, an epoxy resin and a phenolic resin, wherein said phenolic resin is different from said epoxy resin, and further wherein a ratio of an amount of an epoxy group of said epoxy resin to an amount of a hydroxyl group of said phenolic resin in the raw material is adjusted to a value ranging from 0.8 to 1.2 (noted to be 50:50 in paragraphs (pp.) 16-17 and 33), charging the raw material into a predetermined mold (pp. 10 and 29); and heat press forming the raw material charged into a compression mold. Compression is taught to be at a temperature, which is in the range of 140 °C to 220 °C and is referred to compression molding

Art Unit: 1745

in paragraph 29, (also see paragraphs 10, 29-30, 40, and the claims.) Various epoxy and phenolic resins are noted in paragraphs 13-15. In addition, preferred melting temperatures are given for the epoxy of less than 200 °C and greater than 80 °C in order to react with the phenolic resins (pp. 13-18.) Graphite fibers are noted with an average particle size of 5-25 µm. It is noted that the method is used to prepare an electrode plate in a fuel cell, which is also used as a separator of adjacent cells. The reference does not teach that the mold gives a ribbed separator, glycidylamine as the epoxy resin of the separator or resin particles with specific sizes and particle size distributions which are accomplished by spraying and drying the slurry.

Pellegrini et al. (US 4,197,178) teaches a method of preparing a separator wherein a fuel cell separator plate is prepared by mixing a raw material of carbon and a thermosetting resin, such as a phenolic and epoxy resins ((col. 4, lines 45-end, claims 1-3), charging the raw material into a ribbed mold (col. 3, lines 5-15); and heat-press forming the raw material charged into the mold into a ribbed separator at a temperature which is taught to include 140 °C (see col. 3, line 65- col. 4, line 30, figures 1-4 and the claims 1-7.) The separator is gas-impermeable and is pressed adjacent to the solid polymer electrolyte membrane to form a flow path (col. 4, lines 12-end.) The reference does not teach glycidylamine as an epoxy resin of the separator or resin particles with specific sizes and particle size distributions, which are accomplished by spraying and drying the slurry.

Further, Kougorou (JP 59042781, abstract) teaches a method for producing a separator plate for a fuel cell comprising the steps of mixing a carbon powder, an epoxy resin and a phenolic resin, charging the material into a mold and heat pressing (thermal pressure) the material in a temperature range that includes heating to 200 °C and then to a range from 220-270

Art Unit: 1745

°C (p. 368 col. 2, lines 1-20.) A specific example shows a paravinylphenol polymer (phenol) and a novolak type phenol resin initial condensate having an epoxy group (epoxy) added to graphite powder. Novolac phenol resins are disclosed. The carbon is graphite less than 100 microns in size. The loading of the material is done at a temperature that is in the range provided in the instant specification to be less than the carbonization temperature of the material. The material is heated to 180 and finally to 250 °C to harden the molded body. The reference is silent to the ratio of the epoxy group in the epoxy resin to hydroxyl group of the phenolic resin with regard to being in the range of 0.8 to 1.2. As the epoxy resin is reacted with the phenolic resin, one of ordinary skill in the art would choose to react the functional groups in about a 1:1 stoichiometry as the reaction will go to completion and form the desired product. The reference does not teach glycidylamine as an epoxy resin of the separator or resin particles with specific sizes and particle size distributions, which are accomplished by spraying and drying the slurry.

Pellegrini et al. (US 4,197,178) teaches a method of preparing a separator wherein a fuel cell separator plate is prepared by mixing a raw material of carbon and a thermosetting resin, such as a phenolic and epoxy resins ((col. 4, lines 45-end, claims 1-3), charging the raw material into a ribbed mold (col. 3, lines 5-15); and heat-press forming the raw material charged into the mold into a ribbed separator at a temperature which is taught to include 140 °C (see col. 3, line 65- col. 4, line 30, figures 1-4 and the claims 1-7.) The separator is gas-impermeable and is pressed adjacent to the solid polymer electrolyte membrane to form a flow path (col. 4, lines 12-end.) The reference does not teach glycidylamine as an epoxy resin of the separator or resin particles with specific sizes and particle size distributions, which are accomplished by spraying and drying the slurry.

Art Unit: 1745

Taylor (US 4,592,968) teaches method of manufacturing a separator for a fuel cell comprising the steps of mixing a carbon, and a resin, charging the material into a mold, heat pressing the material and grinding a surface of the separator (see example 1, col. 8, lines 5-25.) The molding temperature in the example provided in col. 8 is 149 °C. The completion of manufacturing grinding step is performed before carbonization of the separator plate. The material is not baked. Taylor does not teach the method of manufacturing the separator without baking the separator. The reference also does not teach glycidylamine as an epoxy resin of the separator or resin particles with specific sizes and particle size distributions, which are accomplished by spraying and drying the slurry.

As the prior art does not teach the invention as claimed, claims 4 and 9 are allowed. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745



9.28.06